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In cooperation with the Maryland Geological Survey and the Mary and Agricultural Experiment Station

SOIL SURVEY
WORCESTER COUNTY, MARYLAND

BY

S. O. PERKINS, U. S. Department of Agriculture, in Charge
and S. R. BACON, Maryland Agricultural Experiment Station

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SOIL SURVEY OF WORCESTER COUNTY, MARYLAND

By S. O. PERKINS, United States Department of Agriculture, in Charge, and S. R. BACON, Maryland Agricultural Experiment Station

COUNTY SURVEYED

Worcester County is a part of the lower eastern peninsula of Maryland, known as the Eastern Shore. The Atlantic Ocean forms its eastern boundary. It lies wholly within the Atlantic coastal plain and is the only county in the State bordering on the Atlantic Ocean.

Worcester County is irregular in outline. It extends about 25 miles from east to west in the widest place and about 30 miles from north to south. The land area is 495 square miles, or 316,800 acres. The county is cut by numerous tidewater embayments and estuaries, many of which are navigable.

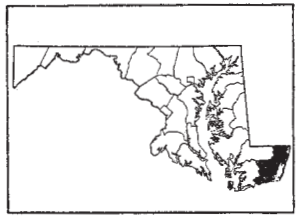

FIG. 1.—Sketch map showing location of Worcester County, Md.

Worcester County embraces four main physiographic divisions, the mainland, the coastal beach, the marshes, and the fresh-water swamps.

The mainland includes practically all the agricultural soils of the county, as the coastal islands and marshes, although of considerable extent, are of little agricultural importance.

The low, sandy coastal beach ranges in width from a few hundred feet to about 1 mile and occurs as a continuous belt along the Atlantic Ocean the entire length of the county. This sand bar is now broken by one narrow inlet, but until about five years ago it was unbroken throughout the county, and large bays, small marshes, and a few coastal islands lay between it and the mainland. The marshes for the most part adjoin the mainland.

The salt marshes, which comprise the third physiographic division, occur principally along the mainland, although there are a few large areas in the southern and northern parts of the county on the bay side of the coastal beach.

The fourth division includes the larger fresh-water swamps, the greater part of which are along Pocomoke River and Nassawango and Dividing Creeks in the western and southwestern parts of the area, and along other small streams throughout the county.

The relief of Worcester County ranges from nearly flat to undulating and gently rolling. Large areas in the northern and western parts are level, except for narrow ridges of sand which rise a few feet

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above the general level of the surrounding land. Roads are commonly constructed on these ridges, because of the better drainage. On the level land, the drainage is poor. Water stands on the surface much of the time, and slight depressions are apt to be mucky or swampy.

The elevation of the county varies from sea level to 51 feet above at Longridge, in the western part. The average elevation of the uplands is about 35 feet. The greater part of the county slopes gradually westward, but the eastern part slopes more abruptly to the southeast.

Drainage into the Atlantic Ocean is effected by many short streams flowing in a general southeasterly direction into tidewater embayments. By far the greater part of the county. however, is drained in a southerly and southwesterly direction through Pocomoke River and its tributaries into Chesapeake Bay. As Pocomoke River has a fall of only slightly more than 30 feet throughout the length of the county, its flow is sluggish, and large swampy areas occur along it. Along the eastern shore and in the shallow bays there are marshes which, like the swamp areas in the western, northwestern, and southern parts of the county, are poorly drained and remain saturated all the time. The streams have reached base level and are consequently sluggish.

In 1742 Worcester County was formed from Somerset County. The early white settlers, from whom the present white population is largely descended, were nearly all English. They located near navigable water, which afforded the only convenient means of transportation. The present population is unevenly distributed. being most dense in the southern, central, northeastern, and eastern parts of the county. According to the 1920 census, the total population is 22,309. all of which is classed as rural, and the density is 45.1 persons to the square mile. Pocomoke City, with a population of 2,444, is the largest town; Snow Hill. with a population of 1,684, is the county seat and the second largest town. Berlin has a population of 1,366 and is third in importance; Ocean City, Bishopville, Stockton, and Girdletree are small towns. Ocean City, during the summer months, has a population of probably 2,000 or more. All of these towns are trading centers and are so located as to be easily reached from the important agricultural sections.

Worcester County has excellent transportation facilities. The Delaware, Maryland & Virginia Railroad runs from north to south along the main divide. The Baltimore, Chesapeake & Atlantic Railway enters the county at the northwestern border and runs to Ocean City. on the coast. The Pennsylvania Railroad crosses the extreme southwestern part of the county. All these lines of transportation are under the control of one corporation and are eliminating water transportation to a large degree. Some freight steamers make occasional trips from Snow Hill and Pocomoke City to Baltimore. The waterways should afford cheap transportation to a large part of the county.

The main highways in Worcester County are hard surfaced, and other hard-surfaced roads are slowly being built. Roads are numer-

ous and in the summer months are in fair condition, although some are so sandy that it is difficult to travel them with an automobile. In many sections where the soil is silty and poorly drained the roads are impassable in wet weather.

Churches and schools are distributed conveniently throughout the county. Telephone service is good, and rural mail routes reach every section.

The local markets buy a small part of the crops produced, and Ocean City, during the summer months, is a good market for vegetables, poultry, and dairy products. Philadelphia, Wilmington, and New York are the principal outside markets for the bulk of the crops produced. Selbyville, just north of the county in Delaware, is an important shipping point for strawberries.

CLIMATE

Worcester County has a mild and healthful climate. The records of the Weather Bureau at Pocomoke City are fairly representative of climatic conditions for the greater part of the county, and the records for Public Landing show the conditions for those parts of the county near tide level. The rainfall is evenly distributed throughout the year, being slightly greater during the summer months. The average rainfall for the year at Pocomoke City is 40.02 inches; at Public Landing, 39.78 inches. In 1904, the driest year recorded at Pocomoke City, the rainfall was 33.27 inches, a normal amount falling during the growing season. In the driest year, 1918, the rainfall recorded at Public Landing was 28.88 inches. The rainfall of the wettest year, 1910, on record at Pocomoke City was 49.13 inches; of the wettest year, 1922, at Public Landing, it was 55.65 inches.

The mean annual temperature at Pocomoke City is 57.4° F. The warmest month is July, with a mean temperature of 77.8°, and the coldest is February, with a mean temperature of 36.4°. The mean annual temperature at Public Landing is 55.1°. The warmest month is July, with a mean temperature of 75°, and the coldest is January, with a mean temperature of 35.2°. The highest temperature recorded at Pocomoke City was 101° in July and at Public Landing was 101° in August; and the lowest recorded temperature at Pocomoke City was −4° in February and at Public Landing was −1° in December and in February.

At Pocomoke City the average date of the last killing frost is April 12 and that of the first is October 30. This gives an average frost-free season of 201 days, which is adequate for all the crops grown in the State. The latest recorded date of killing frost was May 12, and of the earliest was October 21. The frost records for Public Landing are practically the same as for Pocomoke City.

The following tables give the normal monthly, seasonal, and annual temperature and precipitation, as compiled from the records of the weather bureau stations at Pocomoke City and Public Landing:

Normal monthly, seasonal, and annual temperature and precipitation at Pocomoke City

[Elevation, 37 feet]

Month	Temperature			Precipitation		
	Mean	Absolute maximum	Absolute minimum	Mean	Total amount for the driest year (1904)	Total amount for the wettest year (1910)
	°F.	°F.	°F.	Inches	Inches	Inches
December	40.6	74	8	3.35	5.83	3.26
January	38.8	72	4	2.99	1.07	4.17
February	36.4	75	−4	3.49	3.06	1.96
Winter	38.6	75	−4	9.83	9.96	9.39
March	46.9	88	13	3.46	3.26	3.39
April	54.7	93	25	3.18	1.95	5.07
May	64.7	94	35	2.82	1.95	3.03
Spring	55.4	94	13	9.46	7.16	11.49
June	72.7	98	46	3.71	3.04	3.85
July	77.8	101	54	3.73	4.13	5.19
August	76.1	100	53	4.24	2.83	9.23
Summer	75.5	101	46	11.68	10.00	18.27
September	70.4	95	41	3.07	1.63	3.46
October	59.8	91	29	3.64	2.70	4.47
November	49.5	81	17	2.34	1.82	2.05
Fall	59.9	95	17	9.05	6.15	9.98
Year	57.4	101	−4	40.02	33.27	49.13

Normal monthly, seasonal, and annual temperature and precipitation at Public Landing

[Elevation, 10 feet]

Month	Temperature			Precipitation		
	Mean	Absolute maximum	Absolute minimum	Mean	Total amount for the driest year (1918)	Total amount for the wettest year (1922)
	°F.	°F.	°F.	Inches	Inches	Inches
December	39.3	68	−1	3.79	3.53	7.72
January	35.2	64	0	3.45	3.91	5.04
February	36.3	70	−1	3.21	.73	4.72
Winter	36.9	70	−1	10.45	8.17	17.48
March	45.3	76	14	4.06	2.82	6.34
April	52.8	81	23	3.51	4.46	2.31
May	62.1	92	35	2.89	2.22	1.74
Spring	53.4	92	14	10.46	9.50	10.39
June	70.7	94	48	2.66	2.57	2.84
July	75.0	96	48	4.58	.60	11.70
August	74.2	101	52	4.18	1.99	7.68
Summer	73.3	101	48	11.42	5.16	22.22
September	68.3	92	41	2.52	3.99	2.09
October	52.7	90	28	2.54	1.46	2.61
November	47.5	78	18	2.39	.60	.86
Fall	56.2	92	18	7.45	6.05	5.56
Year	55.1	101	−1	39.78	28.88	55.65

AGRICULTURE

The agriculture of Worcester County for a long period following settlement consisted chiefly of the production of staple crops, and from the first the settlers lived comfortably on the products of the land supplemented by an abundance of sea food and game. Lumbering was an important industry from 1870 to 1900. The chief crops in 1879, according to the census, were corn, oats, and wheat. In 1889 corn, oats, wheat, and hay were the principal crops. Corn, oats, wheat, hay, potatoes, orchard fruits, and strawberries were the main products in 1899. The present agriculture consists of the growing of corn, wheat, potatoes, hay and forage, and vegetables.

Corn covers a larger acreage than any other crop, and probably enough is produced to supply the local needs. It is used for feeding work animals, for fattening hogs, and, to a small extent, for bread. Potatoes are the main cash crop of the county, and tomatoes and strawberries are the other two cash crops. Rye, buckwheat, peas, and beans are minor crops.

The following table gives the acreage and yield of the principal crops for the years 1879, 1889, 1899, 1909, and 1919, as reported by the United States census.

Acreage and production of principal crops in 1879, 1889, 1899, 1909, and 1919

Crops	1879		1889		1899		1909		1919	
	Acres	*Bushels*	*Acres*	*Bushels*	*Acres*	*Bushels*	*Acres*	*Bushels*	*Acres*	*Bushels*
Corn	44,588	568,009	42,204	448,924	43,464	714,890	43,353	788,843	40,434	741,159
Oats	6,045	49,018	6,340	63,576	2,557	37,960	855	8,828	526	9,047
Wheat	5,821	41,438	3,661	36,173	5,735	71,420	7,302	83,915	9,125	131,809
Potatoes	------	37,944	470	38,912	1,385	135,947	3,661	410,075	9,434	1,276,839
Sweet potatoes	310	33,942	358	35,591	864	118,191	1,277	178,870	1,648	275,232
Other vegetables	------	------	------	------	------	------	2,737	------	2,827	------
		Tons		*Tons*		*Tons*		*Tons*		*Tons*
Hay and forage	358	409	3,202	4,399	5,421	6,250	5,589	8,100	34,262	29,933
			Trees	*Bushels*	*Trees*	*Bushels*	*Trees*	*Bushels*	*Trees*	*Bushels*
Apples	------	------	44,980	20,642	72,791	74,520	37,542	14,412	147,070	22,510
Peaches	------	------	93,559	7,299	63,100	6,632	30,213	545	35,488	69,283
Pears	------	------	------	------	------	------	6,865	587	3,593	2,526
					Acres	*Quarts*	*Acres*	*Quarts*	*Acres*	*Quarts*
Strawberries	------	------	------	------	1,093	1,771,260	1,205	2,047,457	1,373	1,569,444
					Vines	*Pounds*	*Vines*	*Pounds*	*Vines*	*Pounds*
Grapes	------	------	------	------	13,950	56,600	7,846	21,865	3,086	31,247

A comparison of the census figures from 1880 to 1920, inclusive, shows striking changes in the development of agriculture in the county. It will be noticed that truck farming has increased, owing to the demand in the cities for early truck products and to the improvement of transportation and marketing facilities.

The following table, compiled from the United States census figures, shows the rapid increase in the number of farms and a corresponding decrease in the size of farms:

Number of farms, percentage of the land contained in farms, average size, and improved land per farm in stated years

Census year	Number of farms	Percentage of land in farms	Average size of farms	Improved land per farm
		Per cent	*Acres*	*Acres*
1880	1,639	75.2	145.0	77.7
1890	1,842	75.4	130.0	75.4
1900	1,987	76.2	121.5	66.7
1910	2,344	74.0	100.1	52.0
1920	2,334	65.3	88.6	49.1

According to the 1920 census the value of all domestic animals reached a total of $1,288,060. In that year, there were in the county 3,363 horses, 2,981 mules, 1,555 beef cattle, 3,861 dairy cattle, 1,890 sheep, and 7,708 swine. For 1919 the value of dairy products, excluding those used at home, was $96,624. The value of poultry and poultry products was $561,560.

Every farmer has one or more cows and hogs to supply the home needs, and some have a surplus for sale. A few small dairies scattered throughout the county supply milk to the near-by towns. Small numbers of sheep are raised on some farms.

In the following table the value of all agricultural products in 1919, by classes, is given:

Value of all agricultural products by classes in 1919

Cereals	$1,466,564	Livestock and livestock products:	
Other grains and seeds	7,973	Animals sold and slaughtered (estimated)	$312,999
Hay and forage	548,217	Dairy products, excluding those consumed on the farm	96,624
Vegetables	3,268,226	Poultry and eggs	561,560
Fruits and nuts	457,652	Wool, mohair, and goat hair	3,596
All other crops	501	Total value	6,723,912

The farmers of this county recognize the adaptation of soils to certain crops. Sassafras sandy loam, Sassafras fine sandy loam, Sassafras loam, Keyport sandy loam, Keyport fine sandy loam, Keyport silt loam, and Norfolk sandy loam are considered excellent soils for the production of corn, potatoes, wheat, hay, clover, and tomatoes. Orchards also do well on these soils.

Portsmouth sandy loam, Portsmouth fine sandy loam, Portsmouth loam, Elkton sandy loam, Elkton fine sandy loam, and Elkton silt loam, when properly drained, are well suited to strawberries, corn, grasses, hay, and forage.

Sassafras sand and Norfolk sand have a low farming value but are used for early truck crops and peaches. Except for the pasturage furnished for cattle and hogs, tidal marsh, swamp, and coastal beach are generally recognized as having practically no agricultural value in their present condition.

Farmhouses on the better farms are large and substantial, many having modern conveniences, but most of the tenant houses are small. The barns are reasonably large, but many are not of sufficient size to store all the hay and straw, much of which is put up in stacks. There are numerous outbuildings for storing farm products and machinery. Modern machinery, including three-horse sulky plows, riding cultivators, spike and disk harrows, stalk cutters, wheat binders, mowing machines, hayrakes, tedders, potato diggers, corn binders, lime and manure spreaders, drills, potato planters, spraying machinery, and a few tractors, is used on the better farms.

According to the Maryland farm statistics gathered from the farmers, horses and mules are about equally popular as work animals. The number of mules is, however, on the increase. Most of the horses are of medium size.

Under the general farming practice, the land is broken in the spring. Winter cover crops of rye, oats, crimson clover, and vetch

are turned under on some of the better farms, and a good seed bed is prepared for all crops. Very little plowing is done in the fall.

Potato planting, which generally begins about the middle of March, is done by machinery on many of the farms. The rows are about 2½ feet apart, and the crop receives frequent cultivation. The vines are sprayed two or three times with arsenate of lead or zinc or with Paris green to control the Colorado potato beetle. Bordeaux mixture is used to some extent for blight. Digging usually begins immediately after the Fourth of July. The No. 1 potatoes are picked up, graded, and hauled directly to the shipping point. The culls and small potatoes are also graded. Irish Cobbler is the variety generally planted. The majority of the farmers plant home-grown seed, but some use the northern seed which matures potatoes a week or two earlier than the home-grown. The northern seed is usually planted early in August for use as seed for the next year's early potatoes. Yields are usually light, and the potatoes are small. Home-grown seed plants larger areas than the northern-grown seed, about two and one-half barrels of the home-grown seed being required to plant an acre, and four and one-half barrels of northern seed. Seed potatoes are usually kept in mounds of soil in the field. At the time the early crop is laid by, the common practice is to plant corn in alternate rows.

Tomatoes for canning constitute an important special crop in Worcester County. They are sold to local canneries. The average production is about 5 tons to the acre, for which in normal years $15 a ton is considered a fair price. The principal variety is Stone.

Strawberries are the cash crop third in importance. The plants are set out in the spring, and the matted-row system is used. The principal varieties are Klondike, Missionary, and Howard 17 (Premier). The plants are cultivated during the first year, but they receive no cultivation the second year. A 5–8–5 or a 7–6–5 mixture[1] of fertilizer is applied in quantities ranging from 200 to 600 pounds to the acre. After one or two years of bearing, strawberry beds are usually plowed up.

There are a few large apple and peach orchards in the county. The principal varieties of apples are York Imperial, Stayman Winesap, Yellow Transparent, Winesap, and Grimes Golden. Of the peach varieties the Elberta is probably most extensively grown, but the Carman, Champion, and Belle are popular. Two large nurseries are located in the county—one in the vicinity of Berlin, and another near Showell. One nursery covers between 3,000 and 4,000 acres in this county, and is one of the largest peach and apple nurseries in the country.

The crop rotations most commonly followed in this county are (1) corn, wheat, grass, and potatoes; and (2) corn, wheat, and grass. Other rotations are followed where strawberries and tomatoes are grown. On the dark Portsmouth soils very little wheat is produced, and corn, strawberries, and grass are the most important crops.

Large quantities of commercial fertilizer, as well as manure and compost, are used in this county. The 1920 census reported the use of commercial fertilizer on 2,073 farms, with an average outlay of $313.74 a farm, or a total expenditure of $650,387. Prac-

[1] Percentages, respectively, of ammonia, phosphoric acid, and potash.

tically every farmer uses commercial fertilizer. The fertilizer most commonly used on potatoes is a 7–6–5 or a 5–8–5 mixture, but a few farmers mix their own fertilizer. From 1,500 to 2,000 pounds are applied to the acre. In addition to the commercial fertilizer, a coating of manure is spread over the land, and plowed in before planting. Corn and wheat receive an application ranging from 200 to 400 pounds of a lower grade fertilizer, 3–8–3 or 2–8–2 being commonly used, although some farmers use the same grade for these crops as for potatoes. Corn, when planted after early potatoes, does not receive any fertilizer. Some of the best farmers use lime on the soils.

Farm laborers in Worcester County are rather scarce and are mostly colored. The daily wage is $2 or $3 with one meal; the monthly wage varies from $25 to $35 with board. From 15 to 20 cents a barrel is paid for picking up potatoes, 2½ or 3 cents a quart for picking strawberries, and from 3 to 5 cents a basket for picking tomatoes.

According to the 1920 census, improved land in farms comprised 55.4 per cent of the county. The farms range in size from 10 to 200 acres, averaging 88 acres. A number of land holdings contain several hundred acres. Most of these are divided into several tenant farms, and the census tabulates them as such. A few large tracts of land are held by individual owners or lumber companies. In 1920, 64.9 per cent of the farms were operated by owners, 34.4 per cent by tenants, and 0.7 per cent by managers. Farms are usually rented on a share basis.

The value of all farm property on January 1, 1920, was $6,565 a farm, of which 64.7 per cent represents the value of the land, 20.8 per cent the value of the buildings, 4.6 per cent the value of the machinery and implements, and 9.9 per cent the value of the livestock. The average acre value of land in Worcester County was $47.95, but current land values range from $10 to $200 an acre. Improved farm land currently sells for prices ranging from $75 to $200 an acre, and cut-over or unimproved land brings from $10 to $35 an acre.

SOILS

The soils of Worcester County may be classified as well-drained and poorly drained soils. By far the greater part of the county comprises well-drained soils. These are light in color, ranging from grayish yellow to brown, except in those areas which have been changed by cultivation. This is a region in which the soils with well-developed profiles have the characteristics of the brown soil group. All are poorly supplied with organic matter. The region was forested prior to reclamation for farming, and there has been no opportunity for the accumulation of a large quantity of vegetable matter in the well-drained soils. Even in the forested areas, vegetable mold is present only as a superficial covering or mixed with the soil to a depth of 1 or 2 inches.

In the poorly drained areas the surface soils range in color from almost white to nearly black. The light-colored or almost white soils are found in places subjected to alternate wetting and drying, where-

as the very dark gray or black soils rich in organic matter have developed in permanently wet or saturated areas where vegetation has flourished. In the saturated areas the vegetable matter is thoroughly mixed with the soil material to a depth ranging from 6 to 12 or more inches.

There is no accumulation of lime carbonate in the topsoils and subsoils, but in a few small areas shells are scattered over the surface and are mixed with the soil mass. In this region of temperate climate and heavy rainfall, much leaching has taken place and is still in progress. The soils of the entire county are underlain at a depth varying from 28 to 40 inches below the surface, by a substratum of light-textured material. This material, typically coarser in texture than that of the overlying mass, consists principally of sand, coarse sand, fine gravel, and in some places light-textured sandy loam. The substratum serves to improve the internal drainage of all the soils and is one of the characteristic features of the soils on the Eastern Shore of Maryland and Virginia.

The most striking features of all the well-developed or normal soils in the county are a topsoil composed of comparatively light textured material, a subsoil consisting of heavier textured material, and a substratum which may vary considerably in texture but which is prevailingly lighter than the material which comprises the subsoil and in many places is heavier than that of the topsoil. The texture of these layers, or horizons, varies greatly in the soils of the region. The topsoil, or horizon A, may range from silt loam to sand; the subsoil, or horizon B, from friable clay to light sandy loam or sand; and the substratum, or horizon C, is unconsolidated geologic material, which may be extremely variable in texture, color, and structure. The thickness of these layers differs widely, the surface layer ranging from a few inches in the silt loams to 3 or more feet in the most sandy soils.

All the soils in Worcester County have developed from beds of sand, silt, clay, and gravel. These geologic materials are of such recent age that they are still unconsolidated and immature. The weathering, aeration, and oxidation of the deposits have given rise to a number of soils.

The mature soils of the county are classified in the Sassafras and Norfolk series. The soils of the Keyport, Elkton, and Portsmouth series are not young but on account of the conditions under which they have developed exhibit characteristics of both mature and immature soils.

They present marked differences in profile, and the differences in the various horizons indicate, in a large measure, the maturity of the soil or its comparative age.

The various members of the Sassafras series of soils, as mapped in this county, have profiles identical in general characteristics with those of the other mature soils of the region. They are characterized in the virgin areas by a soil profile as follows: (1) A surface layer which may be a mere film of forest débris consisting of leaves, twigs, and roots, or dark organic material mixed with the surface of the soil, giving it a gray color; (2) horizon A, a brown or yellowish-brown layer ranging in depth according to the texture; and (3)

horizon B or the true subsoil, consisting of reddish-yellow or reddish-brown firm, compact sandy clay or clay which continues to a depth ranging from 30 to 36 inches. The substratum, or horizon C represents the less thoroughly weathered parent material. It consists of material lighter in texture, commonly lighter in color, and more or less mottled.

The heavy texture of the subsoil, or horizon B, constitutes the evidence of maturity in the soils of the humid region, the light color being characteristic of both mature and immature soils. The absence of carbonates may be the result of the character of the parent rock and gives no evidence of the stage of development. Horizon B[2] is the seat of deposition of material carried down from layers 1 and 2[3] by the percolating soil water, contains, therefore, a higher percentage of fine material than the horizon above, constitutes the reservoir of soil moisture for the soil as a whole, and in most places contains a higher percentage of potash than the other horizons. In farming soils this horizon is of great importance. In addition to functioning as a reservoir and as the seat of deposition of material from above, it is, in this latitude at least, the lowest horizon in which the weathering is complete or nearly so.

In areas where, for any reason, surface drainage is imperfect and the soil has been subjected to the influence of excessive moisture for considerable periods of time during parts of the year and to conditions of deficient moisture during periods of dry weather, in other words, to alternating wet and dry conditions, the surface soil is gray or nearly white and is silty in texture. It is underlain, at a depth of a few inches, by a layer of heavier material which is mottled with gray, yellow, and brown. The Elkton soils belong to this group.

In the lowlands of the county, commonly on flat parts of the lower terraces, the soil profile is similar to that of the Sassafras soils down to the bottom of the topsoil, or horizon A. The subsoil, or horizon B, however, shows incomplete oxidation by its mottles of gray, yellow, and brown and is commonly heavier in texture than the two layers above. The mottled condition of the lower part of the subsoil is not the result of imperfect drainage but of ineffective oxidation below a depth of about 18 inches. The Keyport soils are members of this group In areas which have remained swampy or wet for a long time, the surface soil contains sufficient vegetable matter to give it a black color, and the subsoil is variable in color. The Portsmouth soils are members of this group.

The soils of the county have been classified as types on the basis of texture, that is, as to whether the soil is sand, sandy loam, loam, silt loam, clay loam, or clay. This is determined by the proportion of mineral particles of different sizes of which the soil is composed. The soil types are grouped into series on the bases of similarity in color, structure, origin, organic matter, and drainage.

The soils of the Sassafras series have brown or light-brown surface layers which have a thin covering of leaf mold, or they contain,

[2] This horizon in foreign soil literature is designated as the illuvial horizon.
[3] These layers constitute what is known in foreign soil literature as the eluvial horizon.

to a depth of 1 or 2 inches, considerable organic matter. These two layers constitute the topsoil, or horizon A. The subsoil, or horizon B, consists of reddish-brown or yellowish-brown, friable, crumbly sandy clay. Beneath this, the substratum, or horizon C, consists of light-brown or yellowish sandy loam or loose sandy material. These soils occur on both the flat forelands and gently rolling areas. The sand, loamy sand, sandy loam, fine sandy loam, and loam members of the series have been mapped.

The Norfolk soils differ from the Sassafras mainly in color. In the Norfolk soils the gray or yellowish-gray colors predominate. The topsoils consist of gray material, from 1 to 3 inches thick, which contains a small quantity of vegetable matter and is underlain by pale-yellow single-grained material several inches thick. The subsoils consist of yellow sand or friable and crumbly yellow sandy clay which shows uniform oxidation. The substratum, or horizon C, consists of variable light-colored and mottled friable sandy material. Norfolk sand, Norfolk loamy sand, and Norfolk sandy loam were mapped.

The soils of the Elkton series have developed on the poorly drained flat upland areas. These soils have light-gray or almost white topsoils of loam or silt loam covered, in wooded areas, by a very thin layer of leaf mold, and have subsoils of light-gray or bluish-gray heavy tough clay mottled and streaked with yellow and rust brown. In most places below a depth ranging from 30 to 40 inches the material is light-gray sticky sand. Elkton loam, Elkton fine sandy loam, Elkton sandy loam, and Elkton silt loam are mapped.

The Keyport soils occupy an intermediate position, with respect to the color, texture, and structure of the soil material, between the soils of the Sassafras series and those of the Elkton. The surface layers of the Keyport soils are dominantly fine sandy loam or silt loam ranging in color from light brown to grayish yellow, and the subsurface layers consist of heavy brownish-yellow fine sandy loam or silt loam. These two layers constitute the topsoil, or horizon A. The subsoils consist of rather heavy fine sandy clay or clay mottled with yellow, light gray, and yellowish brown. Underlying this clayey material, commonly at a depth ranging from 30 to 40 inches, is more sandy and friable material of light-brown or yellowish color. Keyport sandy loam, Keyport fine sandy loam, and Keyport silt loam are mapped in the county.

The Portsmouth soils have dark-gray or black surface layers which carry a large quantity of organic matter, and light-gray subsurface layers which are usually free from organic matter. These layers are underlain by friable sandy clay which is mottled with light gray, yellow, and rust brown. In their virgin condition these soils are poorly drained. In this county Portsmouth sandy loam, Portsmouth fine sandy loam, and Portsmouth loam are mapped.

In addition to the soils mentioned, three miscellaneous classes of land, swamp, tidal marsh, and coastal beach, were mapped in the county.

The distribution of the soils of Worcester County is shown on the soil map which accompanies this report. The names and pro-

portionate extent of the various soils are given in the following table:

Acreage and proportionate extent of the soils mapped in Worcester County

Type of soil	Acres	Per cent	Type of soil	Acres	Per cent
Sassafras sandy loam	25,216	8.0	Norfolk sandy loam	1,664	0.5
Sassafras fine sandy loam	19,328	6.1	Norfolk loamy sand	5,056	1.6
Sassafras loam	7,872	2.5	Norfolk sand	14,336	4.5
Sassafras loamy sand	12,992	4.1	Keyport silt loam	10,560	3.3
Sassafras sand	5,312	1.7	Keyport sandy loam	5,184	1.6
Elkton silt loam	49,152	15.5	Keyport fine sandy loam	13,184	4.2
Elkton loam	9,280	2.9	Tidal marsh	24,512	8.1
Elkton sandy loam	12,736	4.0	High phase	1,280	
Elkton fine sandy loam	13,504	4.3	Coastal beach	7,936	2.5
Portsmouth loam	21,568	6.8	Swamp	24,256	7.7
Portsmouth sandy loam	14,912	4.7			
Portsmouth fine sandy loam	16,960	5.4	Total	316,800	

SASSAFRAS SANDY LOAM

In uncultivated areas the surface material of Sassafras sandy loam consists of a layer, from 1 to 3 inches deep, of dark-brown loam or sandy loam which contains a small quantity of organic matter and is covered by a thin mantle of leaf mold. This is underlain by light-brown or brown very friable and mellow sandy loam which grades, at a depth ranging from 8 to 12 inches, to slightly lighter colored material a few inches thick. The subsoil is yellowish-brown or reddish-brown sandy clay which is continuous to a depth ranging from 28 to 36 inches. It is friable and crumbly and breaks readily into a fine granular mass. Beneath this layer is yellow loamy sand, loamy fine sand, or light sand. In cultivated fields the color of the surface soil, to the depth of cultivation, is grayish brown or brown. Along the bay front some small rounded gravel is present on the surface and mixed with the subsoil. In some places the surface soil is light grayish-brown loamy sand, and the subsoil is heavy sandy loam. In other places the subsoil is slightly sticky and a little heavier than typical.

This soil is widespread over the county, except in the northwestern part. The largest areas are found on both slopes to Pocomoke River, in the vicinity of Pocomoke City and Stockton, and 2 miles northwest of Snow Hill.

The elevation of the areas of Sassafras sandy loam ranges from a few feet to 40 feet above sea level, but the average elevation is about 22 feet. Areas are nearly level in the terracelike positions and are very gently sloping or undulating in other places. The land lies well for all kinds of crops. Some narrow ridges are slightly irregular, but they are never more than a few feet higher than the surrounding territory.

Owing to the friability of the topsoil, subsoil, and sandy substratum, drainage is excellent, except in places on the forelands where the water table is too near the surface.

Sassafras sandy loam, locally called "red clay land," is the most important soil in the county. It is considered the best soil for the greatest variety of crops, especially truck crops. From 70 to 80 per cent is under cultivation and the remainder supports a healthy

growth of timber, consisting chiefly of oak and pine with some dogwood and holly and an undergrowth of myrtle.

The most important crops are potatoes, tomatoes, corn, and various cover crops, and minor crops are wheat, rye, oats, soy beans, cowpeas, sweet potatoes, and strawberries. Some large orchards are located on this soil, as it is well suited to fruit growing. Hogs, cattle, and poultry are kept on every farm.

Potatoes on this soil yield from 75 to 287 bushels to the acre, depending to a large degree on the time of digging. If dug for the early market before the potatoes have matured, the yields are light. The average yield is about 150 bushels to the acre. Sweet potatoes yield from 100 to 300 bushels to the acre. The normal yield is about 160 bushels, but in some seasons much higher yields are obtained. Corn yields from 25 to 60 bushels to the acre, and hay from 1 to 2 tons. Corn interplanted with potatoes does not always mature but produces good forage. The average yield of tomatoes is about 5 tons to the acre. Good yields of nearly all farm crops, both truck and staple, are obtained on this soil.

Sassafras sandy loam is easily tilled because of its mellowness and friability. It can be plowed under a wide range of moisture conditions, as it does not clod badly when wet nor bake to any great extent when dry. It responds readily to manures and fertilizers, and all crops are heavily fertilized. Potatoes usually receive an application of about 2,000 pounds of a 7–6–5 fertilizer. For tomatoes, from 600 to 800 pounds of commercial fertilizer are applied. The analyses most commonly used are 5–8–8 and 6–8–8. Corn is not fertilized, except when grown independently, the residue from the potato crop being ample to insure good yields. Strawberries require fertilizing, and about 600 pounds to the acre of a 5–8–5 or 7–6–5 mixture are used.

Sassafras sandy loam ranges in value from $75 to $200 an acre, depending on location and improvements. The average price is about $100 an acre.

The best methods of improving Sassafras sandy loam are by systematic crop rotation, deep plowing, growing cover crops, and liming. Common rotations at present are potatoes, corn, and grass. If wheat is grown, the rotation consists of corn, wheat, grass, and potatoes, in which the grass seed is sown with the wheat in the fall. A more definite rotation which includes a leguminous crop would be more beneficial. When the soil is limed alfalfa does well.

SASSAFRAS FINE SANDY LOAM

Sassafras fine sandy loam, to a depth ranging from 8 to 12 inches, consists of grayish-brown mellow fine sandy loam. This is underlain, to a depth of about 16 inches, by brownish-yellow or yellowish-brown slightly more compact fine sandy loam. The subsoil is reddish-brown fine sandy clay loam or fine sandy clay which grades, at a depth varying from 30 to 36 inches, to loamy fine sand of about the same color. In places the subsoil is rather sticky when wet. Usually where the surface configuration is irregular the subsoil is lighter in texture, being fairly heavy fine sandy loam, and is more nearly yellowish brown than reddish brown. In other places, espe-

cially where this soil is associated with Keyport fine sandy loam and Elkton fine sandy loam the subsoil is nearly yellow and somewhat resembles that of Norfolk fine sandy loam. In the best drained areas the subsoil is reddish brown.

Sassafras fine sandy loam occurs in small or medium-sized areas in the northeastern, central, and southern parts of the county, the largest areas being found along the main highways in the vicinity of Girdletree, Berlin, Showell, Welbourne, and Beaverdam.

Areas of Sassafras fine sandy loam are generally nearly level, but the surface varies in places from gently undulating to slightly rolling. Undulating areas occur in the vicinity of Welbourne, 2 miles east of Snow Hill, and 2 miles west of Public Landing. The elevation ranges from a few feet above sea level on the bay front to about 40 feet on the upland.

For the most part the soil is well drained. Drainage is best where the subsoil is friable. The subsoil of a few level areas and of some areas lying only a few feet above sea level is heavy enough to retard the movement of soil water, and artificial drainage is necessary. The underdrainage of this soil is excellent because of the porosity of the substratum material, but on the whole, the drainage is not so good as on areas of Sassafras sandy loam.

Sassafras fine sandy loam, though not so extensive as Sassafras sandy loam, is about as important agriculturally and is well adapted to the production of all the more important crops. At present from 70 to 80 per cent of it is cultivated, and the remainder supports a forest growth similar to that on Sassafras sandy loam.

The principal crops are potatoes, corn, forage, cover crops, strawberries, and tomatoes, and the minor crops are watermelons, cantaloupes, cabbage, sweet potatoes, wheat, and soy beans. Many truck and garden crops are grown on a small scale to satisfy the local and home demands. Rather large orchards are found on this soil and peaches, apples, plums, and grapes do well. The crop yields are practically the same as those obtained on Sassafras sandy loam.

This soil and Sassafras sandy loam are managed in a similar way, except that more care must be taken when plowing or cultivating Sassafras fine sandy loam as there is a slight tendency for the soil to puddle when wet and to bake when dry. The same methods of fertilization and the same quantities of fertilizer are used as on the sandy loam member of this series.

Sassafras fine sandy loam ranges in value from $75 to $200 an acre, depending mostly upon the state of improvement and the location. The average price is about $100 an acre.

Sassafras fine sandy loam will respond to the same methods of improvement as Sassafras sandy loam.

SASSAFRAS LOAM

The topsoil of Sassafras loam consists of a layer, from 8 to 12 inches deep, of grayish-brown or brown, heavy loam or silt loam underlain by a subsurface layer of greenish-yellow or buff-yellow heavy loam or silt loam which is slightly heavier than the surface layer and which continues to a depth of 18 inches. The subsoil consists of yellowish-brown or slightly reddish brown silty clay loam mate-

rial which continues to a depth ranging from 36 to 40 inches. Commonly below this depth a substratum of brownish-yellow loamy fine sand occurs. Where this soil is associated with Elkton silt loam, the surface soil contains a higher percentage of silt, and the subsoil is heavier than it is in the typical soil and is more decidedly yellow, resembling the subsoil of Keyport silt loam.

Mapped areas of Sassafras loam include small patches of Keyport silt loam, and in places this soil is influenced by Elkton silt loam. In spots the texture is that of very fine sandy loam. Everywhere this soil runs high in silt, but it is mellow and friable. In forested areas, there is a thin cover of leaf mold on the surface.

The largest areas of Sassafras loam occur about 1½ miles northwest of Snow Hill, 1 mile north of Cottingham Ferry, on Sinepuxent Neck, in the vicinity of Ironshire Station, and along the highway south of Berlin. Scattered smaller areas are commonly adjacent to Keyport silt loam and Elkton silt loam.

Areas of Sassafras loam are level, gently rolling, or slightly undulating. The elevation ranges from 6 to 45 feet above sea level. All of the land lies well for farming. Drainage is good and artificial drainage is rarely necessary, although a few level areas are drained by small open ditches or underground tiles. Owing to the sandy substratum which usually occurs at a depth varying from 36 to 40 inches, underdrainage is excellent. The power of the subsoil to maintain a good supply of moisture and at the same time to allow good aeration by virtue of its structure, makes this soil well adapted to those crops which require a long growing season.

Sassafras loam is not extensive but is one of the most important soils for general farming in Worcester County and practically all of it is under cultivation.

The most important crops are potatoes, wheat, corn, hay, and tomatoes. Orchard trees do well, especially apple trees. (Pl. 1, A.) Potatoes do not mature so early on this as on the sandier soils, but the yields are slightly heavier than on any other soil in the county. Potatoes, when allowed to mature, yield from 75 to 150 barrels to the acre; corn, from 40 to 60 bushels; hay, about 2 tons; wheat, from 15 to 35 bushels; and tomatoes, from 5 to 8 tons

This soil is managed and fertilized in the same way as Sassafras sandy loam.

Land values range from $100 to $200 an acre, depending upon the location of the areas.

This is probably the strongest and best improved soil in the county. The methods suggested for the improvement of Sassafras sandy loam will also prove satisfactory on this soil.

SASSAFRAS LOAMY SAND

The topsoil of Sassafras loamy sand consists of a surface layer, from 9 to 12 inches thick, of grayish-brown or brown loamy sand underlain by a subsurface layer of yellowish-brown compact loamy sand which continues to a depth ranging from 15 to 20 inches. The subsoil is brown or reddish-brown loamy sand or light sandy loam which continues to a depth varying from 30 to 36 inches. The substratum is yellowish sand. In many places the subsoil is yellowish-brown or brown loamy sand resembling the subsoil of Norfolk

loamy sand. Included with mapped areas of this soil are patches of the fine sandy loam, sandy loam, and sand of the Sassafras series and small patches of Norfolk sand.

The largest areas of Sassafras loamy sand are in the vicinity of Snow Hill, Whiteburg, and about 2 miles northeast of Stockton. Other smaller areas are scattered throughout the county.

Areas of this soil range from gently undulating to undulating, although some areas are comparatively level, and others are slightly sloping. Drainage is excellent and in places is excessive, owing to the openness of the substratum.

Sassafras loamy sand is not so important a soil agriculturally as Sassafras sandy loam, but crops on it mature somewhat earlier. Most of it is under cultivation, and the remainder supports a forest growth chiefly of second-growth pine and oak.

The same crops are produced on this soil as on Sassafras sandy loam, and farm practices in general are similar. Planting is usually done earlier, and potatoes and sweet potatoes from this soil are marketed at least a week earlier than those from the surrounding soils. The yields of potatoes, sweet potatoes, and corn are slightly lower than on Sassafras sandy loam. Potatoes yield from 25 to 65 barrels to the acre; sweet potatoes from 40 to 75 barrels; and corn from 15 to 30 bushels. The same kinds of fertilizer are used as on the other soils, but heavier applications are necessary.

Sassafras loamy sand is sometimes sold with adjoining soils, but when sold separately the selling price is from $50 to $100 an acre, depending upon the location and improvements.

The best methods of improving this soil are the application of all available manure and the growing and turning under of cover and green-manure crops. The use of more lime would increase crop yields.

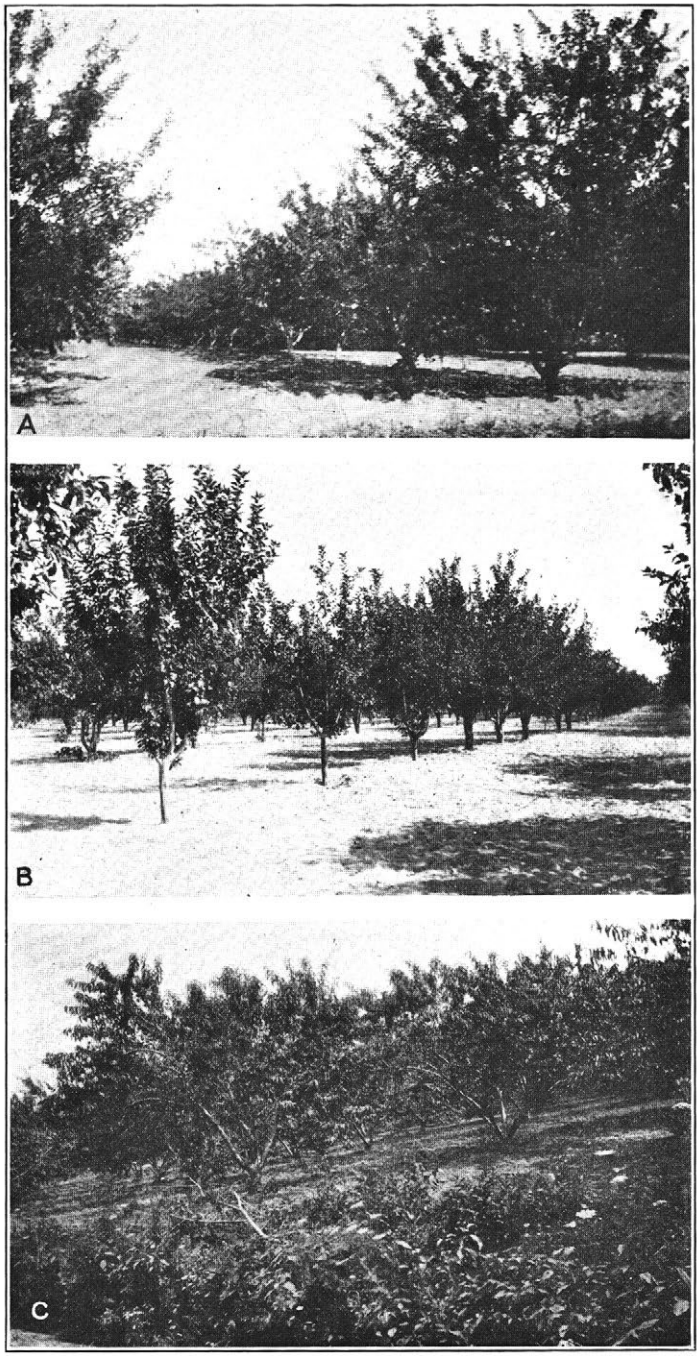
SASSAFRAS SAND

The topsoil of Sassafras sand consists of grayish-brown or brown mellow sand from 7 to 9 inches deep, underlain by grayish-brown, yellowish-brown, or brownish-yellow sand which continues to a depth ranging from 15 to 18 inches. The subsoil of yellowish-brown or reddish-brown loose sand grades, at a depth of about 28 inches, to yellowish sand which continues downward several feet, becoming lighter in color with depth.

Patches of Sassafras fine sand and loamy sand and of Norfolk sand are included with mapped areas of this soil. Along the southwestern boundary line adjoining Somerset County and in a few other places in the county the sand is much finer in texture and would have been mapped as Sassafras fine sand if the areas had been larger.

This soil occurs in small areas in different parts of the county, the largest areas occurring along the east bank of Pocomoke River north and south of Ninepin Bridges Creek, in the vicinity of Muskrattown and Bishop, and 1 mile northwest of Wesley.

Areas of this soil range from almost level to gently undulating and rolling. Drainage is excessive. The soil is unimportant agriculturally and probably not more than 30 per cent of it is under cultivation. The remainder supports a forest growth of small trees similar to those on Sassafras loamy sand. Sassafras sand is best suited to truck crops, but all crop yields are light.



A.—Apple and peach orchard on Sassafras loam
B.—Orchard of early apples on Elkton fine sandy loam
C.—Peach orchard on Keyport silt loam

This soil is managed and fertilized in about the same way as Sassafras loamy sand, and the same methods of improvement are practiced on both. Sassafras sand is always sold in connection with surrounding soils. Peach orchards do well on it. It would probably be best for this soil to remain in forest, except where it is used for early truck crops.

ELKTON SILT LOAM

The topsoil of Elkton silt loam, to a depth ranging from 6 to 12 inches, consists of light-gray or nearly white silt loam which in wooded areas has a thin cover of leaf mold. The subsoil is plastic clay loam or clay mottled with gray, light gray, brown, and yellow. Below a depth varying from 30 to 40 inches the material is more friable and is lighter gray. In some areas the material, at a depth of 28 or 30 inches, is gray or mottled compact coarse or medium sand. This is a fine-textured soil, inclined to puddle when wet, but mellow and friable when dry. Mapped areas of this soil include patches of Portsmouth loam and, in the vicinity of Libertytown, some areas of Elkton very fine sandy loam. This soil is locally known as " white-clay," "pipe-clay," and " white-oak " land.

Elkton silt loam is the most extensive soil in this county, aggregating 76.8 square miles. It occurs in three large areas on the uplands and in numerous smaller areas in other parts of the county. The largest area lies between Pocomoke River and the towns of Newark, Berlin, and Saint Martin. This area is about 18 miles in length, extending from near Public Landing almost to Whaleysville, and is 6 miles wide at one point. The second largest area occurs south of Pocomoke City, and the third largest is just west of Corbin in the southwestern part of the county.

This soil occurs both on the forelands bordering the salt marshes and in large areas on the uplands. The areas are everywhere broad, level, depressed, or only gently inclined, and are found around the headwaters of streams or along small stream courses where the fall is slight and drainage is poorly established. The elevation ranges from a few feet to 40 feet above sea level. The upland areas average about 30 feet above sea level.

Drainage of this soil in its natural condition is poor. Consequently it is cold and " sour " and puddles easily if plowing is not done under proper moisture conditions. Drainage is accomplished mostly through open ditches which must be kept clean. Before the Civil War, when labor was plentiful, much of this soil was cultivated, but the ditches have since been allowed to fill up, and at present large areas are covered by small trees, chiefly beech, pine, oak, and gum.

This is not an important soil agriculturally, largely because of its poor drainage. After the Civil War, where it was properly drained, good yields of corn, wheat, and hay were produced, and in many places where the ditches are kept open good yields of these crops, especially of wheat and hay, are still obtained.

Elkton silt loam has developed from quiet-water deposits where the sediments were laid down under uniform conditions. The material has undergone no great change, owing to its position and its wet condition. It is very uniform throughout its extent, except for

the slight accumulation of organic matter on the surface. About half of this soil is cleared, and approximately 30 per cent is under cultivation. Some of it is used for pasture.

The original timber growth was chiefly of white oak. Because this soil is best suited to the growing of grasses, stock raising is practiced to some extent. On this land wheat yields from 10 to 25 bushels to the acre, and hay from 1 to 2 tons. Tomatoes are grown in some places and give fair yields. Strawberries also do fairly well. When the soil is limed it produces good stands of red clover.

Fertilizer is used for wheat at the rate of 200 to 400 pounds of a 3–8–3 or 4–8–4 mixture to the acre. All available manure is spread over the land.

Elkton silt loam currently sells at prices ranging from $10 to $80 an acre, depending mostly upon drainage conditions, nearness to transportation lines, and state of improvement. The average is probably not more than $35 an acre.

Elkton silt loam is best suited to wheat and grass, and stock raising could be increased. Thorough drainage is necessary to make this soil fit for farming purposes, and liberal applications of lime are required to correct its acidity. Growing soy beans and other cover crops, turning them under as green manure, and adding all available manure and leaf mold will greatly improve the physical condition of the soil. In Somerset County soil of this type is being farmed more extensively and good yields of corn, wheat, and soy beans are obtained. In this county most of this soil is being allowed to grow up to forest. This is probably the best use which could be made of the most poorly drained parts.

ELKTON LOAM

Elkton loam, to an average depth of about 10 inches, is gray or brownish-gray loam which is fairly heavy but which contains enough sand to make it friable and gritty to the touch. This is underlain by steel-gray heavy clay or plastic clay mottled with yellow and rust brown. Below a depth ranging from 24 to 36 inches the material is gray or grayish-yellow sticky loamy sand, usually saturated with water. Mapped areas include many textural variations. Within a small area the surface soil may vary in texture from heavy sandy or fine sandy loam to silt loam, but these variations have little or no influence on the agricultural value of this soil. In an area about 2 miles east of Snow Hill patches of silt loam and sandy loam are included with mapped areas of Elkton loam because of their small extent. Small areas of Portsmouth loam, Portsmouth fine sandy loam, and Keyport loam, and patches of Elkton loamy sand are also included.

Elkton loam, as well as all the other Elkton soils, is locally known as "white pipe-clay land." It occurs on the bay front and drainage divide, mostly in the northeastern and southwestern parts of the county, in a few small areas in the northwestern and central parts, and in the vicinity of Snow Hill. The largest areas are in the vicinity of Sinepuxent, Friendship, southeast of Bishopville, east of Snow Hill, and in the vicinity of Pocomoke City and Beaverdam.

Areas are flat, and saucerlike depressions are numerous on the upland drainage divide. In wooded areas small hummocks have been caused by the upturned roots of falling trees. Small ridgelike patches of light soil occur in poorly drained tracts of the large areas. These ridgelike patches are only a few inches higher than the surrounding soil, but are somewhat better drained.

In general, drainage is poor, but the areas on the upland plains are slightly better drained than those on the foreland, as the sandy substratum affords better underdrainage. Some of this soil is in a semiswampy condition and is unsuited to the present system of agriculture. Where this soil occurs along the bay front bordering tidal marsh the two soils grade into each other.

Elkton loam is not extensive. About 30 per cent of it is under cultivation, the remainder being forested chiefly with gum, oak, pine, and maple. Much of the timber has been and is still being cut about as fast as it grows.

Agriculture on Elkton loam consists mostly of the production of staple crops, mainly corn, grass, and wheat. Some strawberries and potatoes are grown. On the better drained farms the yields are a little better than those obtained on Elkton sandy loam. Elkton loam requires thorough drainage before agriculture can be carried on satisfactorily. Strawberries do better on the more poorly drained areas than any other crop.

The methods of cultivation and fertilization are the same as on the better soils of the county.

Elkton loam ranges in value from $25 to $125 an acre, depending on drainage, improvements, and nearness to towns and shipping points. The low areas near sea level, when sold separately, have a low value.

Recommendations for the improvement of Elkton sandy loam are applicable to Elkton loam. Thorough drainage is essential for the best development of this soil. The puddling which follows rains could best be prevented by plowing under coarse manures, green manures, and "pine shatters." The liberal use of lime will greatly improve the physical condition as well as correct the acidity.

ELKTON SANDY LOAM

Elkton sandy loam, to a depth of 8 inches, is light-gray or gray medium sandy loam, which in many places is rather heavy and is ash gray or whitish when dry. The subsurface layer, continuing to a depth of about 16 inches, is light-gray or whitish heavy sandy loam or sandy clay loam, in places mottled with yellow and rust brown. The subsoil consists of heavy mottled gray, yellow, dull-red, and brownish sandy clay loam or sandy clay, in places sticky and plastic. Thin layers of gray plastic clay are commonly found in the subsoil. As a rule, between depths of 28 and 40 inches there is a substratum of gray or yellowish-gray sticky sand which is generally saturated with water.

The degree to which the subsoil is mottled varies considerably throughout the county. In some places it is intensely mottled with yellow and brown and lacks the characteristic gray mottling, and in other places almost no mottling appears, the color being bluish

gray, light gray, or drab. Included with mapped areas of this soil are patches of Portsmouth sandy loam, Elkton loam, and Keyport sandy loam which were too small to be shown on the map. In a few places along the bay front some gravel is scattered throughout the surface soil and subsoil, and in other places patches of Elkton loamy sand and sand are included in mapping. In such spots the surface soil is gray loamy sand from 9 to 12 inches deep, and the subsoil is light yellowish-gray or whitish loamy sand. The largest spots of this kind are found on the Isle of Wight.

Elkton sandy loam occurs in medium-sized or fairly large areas throughout the county, but mainly on the drainage divide and bordering the bay on the seaward side of the county where it is only a few feet above sea level and is subject to continual seepage from higher land.

Areas of this soil are flat and drainage is poor, the water table in many places being near the surface.

This is not an important soil agriculturally, most of it being forested with second-growth timber consisting principally of sweet gum and black gum, white oak, pine, maple, and a heavy undergrowth of huckleberry, myrtle, and other shrubs. About 20 per cent of the land is under cultivation, and where it is well drained fair crops are obtained.

The chief crops are potatoes, corn, hay, and strawberries. Although the farming methods are similar to those used on the better-drained soils, truck crops are grown to a smaller extent. Corn is the crop most generally grown. Minor crops are the same as on the other Elkton soils. In rainy seasons the crops have a tendency to drown out; in dry seasons they are affected by the drought. The yields are lower on the average than those on the Sassafras and Keyport soils, but in favorable seasons large yields are obtained. Potatoes yield from 20 to 100 barrels to the acre, depending largely upon the time the potatoes are dug; corn, from 15 to 50 bushels; and strawberries, from 2,000 to probably 3,000 quarts. Hay gives fair yields. Winter cover crops are sometimes frozen out.

Elkton sandy loam can not be plowed so early in the spring as the better-drained soils, but it is managed in about the same manner, as regards tillage and fertilization, as are the better-drained soils.

This soil, when under cultivation, ranges in price from $40 to $100 an acre, depending on location, drainage, and improvements. Much of it is sold in connection with better-drained soils and brings a higher price.

Adequate drainage is the first step in improving and maintaining the fertility of Elkton sandy loam. By deepening and extending natural drainage ways, by making open ditches, and by tile draining, much of this soil could be made productive. The addition of all available manures, leaf mold, green manures, or any kind of material that will add organic matter to the soil, will be very beneficial. Liming gives good returns.

ELKTON FINE SANDY LOAM

Elkton fine sandy loam, to a depth of 6 or 8 inches, consists of gray or dark-gray fine sandy loam, which when dry is ash gray.

This is underlain, to a depth ranging from 14 to 20 inches, by light-gray fine sandy loam or sandy clay loam which is in places mottled with brown or rust-colored stains. Below this is yellow, gray, and rust-brown mottled, heavy, plastic fine sandy clay or clay which continues to a depth ranging from 30 to 36 inches. The substratum is gray or grayish-yellow loamy sand or sticky sand which is generally saturated with water.

In places, the subsoil is light gray, slightly mottled, and rather friable to a depth of 3 feet. Such areas would have been mapped as loamy fine sand if they could have been separated. In other places the subsoil is bluish heavy, sticky sandy clay. Included with mapped areas of this soil are small patches of Portsmouth fine sandy loam, Elkton loamy fine sand, and Elkton sandy loam. The included areas of Elkton loamy fine sand have a subsoil of gray loamy fine sand beginning at a depth of about 8 inches and continuing through the soil below a depth of 3 feet.

Elkton fine sandy loam occurs in small and fair sized areas throughout the county, the largest ones being in the vicinity of Girdletree, Berlin, Sinepuxent, and Taylorville, in the northwestern part of the county west of Pocomoke River, east of Bishop, and southwest of Public Landing.

The areas are flat or in saucerlike depressions. Drainage is poor, though it is better than on the other Elkton soils. Less than one-half of this soil is under cultivation. The remainder supports a fair stand of second-growth pine, oak, gum, holly, beech, and some maple, and an undergrowth of huckleberry, myrtle, and other shrubs.

Corn, strawberries, and tomatoes are the most important crops. Some apple orchards are found on this soil. (Pl. 1, B.) In favorable seasons the yields on well-drained areas are only slightly lower than those obtained on the better drained soils. The strawberry yields are as high as on any other soil. Like the other Elkton soils, this so l can not be plowed so early in the spring as the Sassafras or other better drained soils.

About the same kinds and quantities of fertilizer are used on this soil as on the more poorly drained soils of the county.

Land values range from $40 to $100 an acre, depending upon drainage conditions, improvements, and nearness to towns and shipping points. Drainage is absolutely necessary for the improvement of this soil. The application of barnyard manure and leaf mold, the growing and turning under of soy beans, and liberal applications of lime will be found to be good practices for the improvement of Elkton fine sandy loam.

PORTSMOUTH LOAM

The topsoil of Portsmouth loam consists of black mellow loam or spongy loam from 10 to 18 inches deep. In much of this soil the surface soil is rich in organic matter and in places resembles muck. The subsoil is light gray or mottled light gray, yellow, and brown and varies from heavy sandy loam to plastic silty clay loam. Below a depth ranging from 28 to 36 inches is the substratum of gray, wet fine sand or loamy sand, which is sticky in places.

In places the subsoil is friable sandy loam mottled with rust color, reddish brown, and drab, and in small areas it has a coffee-brown layer. In the northwestern part of the county the surface soil is dark-brown spongy loam. In areas associated with the Elkton soils, the subsoil is commonly heavy and in many places is plastic clay. Included with the Portmouth loam as mapped are small areas of Portsmouth fine sandy loam and Portsmouth silt loam.

Portsmouth loam occurs in large areas in a section known as the forest, in the northwestern part of the county west of Pocomoke River. Other large areas are in the extreme northern part of the county north and east of Whaleysville along the Delaware State line, just west of Hollygrove, east of Betheden Church, and southeast of Pocomoke City. Small patches are scattered throughout the greater part of the county. The largest areas are in many places closely associated with Portsmouth sandy loam and Portsmouth fine sandy loam.

Areas of Portsmouth loam are very similar in surface features to those of Portsmouth sandy loam, except that they are somewhat more depressed, having been developed under more or less swampy conditions which favor the rapid accumulation of decaying vegetable matter. Natural drainage is almost entirely lacking and water stands on the surface during wet seasons. Portsmouth loam, in its natural condition, is not suited to agriculture, but when canalled and laterally drained it becomes a strong soil for some crops.

The greater part of this soil is forested with pine, gum, oak, holly, maple, bay bushes, and heavy undergrowth. Corn, potatoes, and strawberries are the main crops and the yields are good on the better drained areas. Onions and cabbage also do well.

Portsmouth loam, in wet seasons, is difficult to manage. In years of frequent spring rains, much of this soil is allowed to lie idle as it is too wet for planting a crop; but in favorable seasons, where the land has been well drained, it is a productive soil. Much more of it could be reclaimed by dredging out the main waterways. In the extreme northwestern part of the county, north of Whaleysville, and in other sections of the county some of it has produced heavy yields of corn, strawberries, and potatoes. The liberal use of lime would help this soil.

PORTSMOUTH SANDY LOAM

The surface soil of Portsmouth sandy loam is very dark gray or almost black sandy loam or fine sandy loam from 8 to 12 inches deep. Below this is a layer, from 2 to 4 inches thick, of light-gray sandy loam. The subsoil may be light-gray heavy sandy loam, sticky sandy clay loam, or friable sandy clay mottled with yellow and rust-colored stains in the lower part. Below a depth of 24 inches, the material is light yellowish-gray sticky sand or loose fine sand saturated with water. Many variations occur. Portsmouth sandy loam, as mapped in this county, includes many small areas of other soils, such as Portsmouth loam, Norfolk loamy sand, and all the Elkton soils. These were so badly mixed or occurred in such small patches that they could not be separated on the map.

Portsmouth sandy loam occurs mainly in two large areas, one in the extreme southern and the other in the extreme northern part of the county. A few fair-sized patches are found in the northwestern part of the county. Practically all of this soil occurs on the flat, level drainage divides, on flat uplands, and in slight depressions.

Most of the Portsmouth sandy loam is very poorly drained naturally, but where it is well drained it is considered a good farming soil, especially for the production of strawberries. Probably from 40 to 50 per cent of it is under cultivation. The remainder supports a forest growth of oak, pine, maple, gum, holly, and thick underbrush.

Strawberries and corn are the main crops. Potatoes, tomatoes, oats, rye, and some soy beans are raised. Yields of corn are satisfactory, and excellent yields of strawberries are obtained.

Portsmouth sandy loam is managed as are the better-drained soils of the county. The same kind of fertilizer is used, but the applications for corn are lighter than for strawberries or potatoes. This land is held at prices ranging from $30 to $100 an acre, depending mostly upon drainage, the nearness to towns and shipping points, and improvements. Portsmouth sandy loam can not be used for farming without first being drained. After drainage, heavy applications of lime are necessary for crop production.

PORTSMOUTH FINE SANDY LOAM

Portsmouth fine sandy loam consists of a layer, from 7 to 10 inches deep, of almost black or dark-gray fine sandy loam, underlain by mottled gray, brown, and yellow fine sandy clay loam or fine sandy clay which grades, at a depth ranging from 24 to 30 inches, to light-gray or almost white slightly sticky fine sand saturated with water. In places the surface soil contains a high percentage of organic matter and resembles that of Portsmouth loam, but where the surface soil is dark gray, the percentage of organic matter is much less. In many places where this soil is associated with the Elkton soils, the upper part of the subsoil is heavier, containing thin layers of clayey material. As mapped, Portsmouth fine sandy loam includes patches of Portsmouth loam, Elkton loam, Elkton fine sandy loam, Portsmouth sandy loam, and patches of St. John's fine sandy loam which differs from Portsmouth fine sandy loam only in having a coffee-colored hardpan.

Most of the Portsmouth fine sandy loam occurs in what is known as the forest in the northwestern part of the county west of Pocomoke River. Other areas are about 2 miles southeast of Pocomoke City, north of Whaleysville, and about 3 miles east of Berlin. A few smaller patches are found in other parts of the county.

This soil occurs in saucerlike or depressed areas. Drainage is very poor, the water table being near the surface. In its present condition, this is not an important soil agriculturally, and probably only 25 or 30 per cent of it is under cultivation. The areas in the northwestern part of the county north of Whaleysville are practically all under cultivation.

The forest growth consists chiefly of second-growth pine, oak, gum, bay bushes, and an undergrowth mostly of huckleberries.

Corn and strawberries are the principal crops. Corn yields from 20 to 40 bushels to the acre and strawberries from 60 to 100 crates, or from 1,800 to 3,000 quarts.

This soil is rather hard to manage on account of its position with regard to drainage. The same kind of fertilizer is used as is applied to the other soils of the county, but the applications are lighter.

Portsmouth fine sandy loam, in its natural state, is not a reliable soil. The price is low, ranging from $10 to $50 an acre, depending upon drainage, improvements, and nearness to towns or shipping points.

Drainage is absolutely necessary in order to make Portsmouth fine sandy loam productive. By the use of open ditches and tile drains, much of it can be brought to a good state of cultivation. Heavy applications of lime are necessary to correct acidity.

NORFOLK SANDY LOAM

The topsoil of Norfolk sandy loam is gray, grayish-yellow, or slightly grayish brown mellow sandy loam, from 7 to 9 inches deep, underlain by pale-yellow or yellow heavy sandy loam which continues to a depth of about 14 inches. The subsoil is yellow or slightly brownish yellow friable sandy clay or sandy clay loam. Norfolk sandy loam is not typically developed in Worcester County. Included with it are patches of Sassafras sandy loam, Sassafras fine sandy loam, Norfolk loamy sand, and Norfolk fine sandy loam. The largest area of Norfolk fine sandy loam is north of Purnell Pond.

Only a few small areas of Norfolk sandy loam are mapped in Worcester County. The largest are in the vicinity of Boxiron and Girdletree, 3½ miles south of Whiteburg, and 1¼ miles south of Pocomoke City.

Areas of this land, as a rule, are level, and the drainage is good. Because of its small total extent it is unimportant in the agriculture of Worcester County, but it is a very good soil and most of it is under cultivation. Farther south, it is one of the best soils on the coastal plain. The forest growth is the same as that on the Sassafras soils. The same kind of crops are grown as on Sassafras sandy loam, but the yields are probably lower. This soil is fertilized and managed in the same way as are the adjoining soils, and it responds to the same methods of improvement as Sassafras sandy loam. It is usually sold in conjunction with the adjoining soils.

NORFOLK LOAMY SAND

Norfolk loamy sand, to a depth of about 6 or 8 inches, is gray or grayish-yellow loamy sand or loamy fine sand, underlain by yellow or faintly brownish yellow loamy sand which continues to a depth ranging from 30 to 36 inches. The lower part of this layer is slightly heavier. In some places, the surface soil is loamy fine sand, and in other places the subsoil is yellowish brown or slightly reddish brown, resembling that of Sassafras loamy sand. Mapped areas of this soil include many patches of Sassafras loamy sand, of Sassafras sandy loam, and of Sassafras fine sandy loam.

Norfolk loamy sand is not an extensive soil but is found in small areas throughout the county, the largest occurring 1½ miles southwest of Girdletree, 1½ miles southeast of Millville, 2½ miles south of Whiteburg, and 2½ miles north of Whiteburg.

Areas of this soil are gently undulating or level. A few are slightly ridgelike but are only a few feet higher than the surrounding soils. Drainage is good.

This is not so important a soil agriculturally as Sassafras loamy sand, but it gives fair yields of truck crops. Probably 75 per cent of it is under cultivation, and the remainder supports a forest growth similar to that on the other upland soils of the county.

The crops grown on this soil are the same as those produced on Sassafras sandy loam and Sassafras fine sandy loam. The yields are considerably less than those on the heavier Sassafras soils, but the crops mature a little earlier. The soil is managed in the same way as Sassafras loamy sand and the same kind and quantity of fertilizer is used. The early potato crop receives a heavier application of fertilizer.

The suggestions for the improvement of Sassafras sandy loam and Sassafras loamy sand apply to this soil.

NORFOLK SAND

The topsoil of Norfolk sand is gray or grayish-brown sand from 6 to 8 inches deep. The subsoil of yellow loose sand continues to a depth of 40 or more inches. In forested areas, there is a surface layer, about an inch thick, of dark-gray sand formed by an accumulation of organic matter. Norfolk sand, as mapped in this county, includes many small patches of Sassafras sand, Sassafras loamy sand, and Norfolk loamy sand, all too small or badly mixed to be indicated on the map. Where this soil occurs near the marshes or on islands in the bay the surface soil is darker in color and the subsoil is light gray and wet.

Mapped areas of Norfolk sand include smaller areas of Norfolk fine sand, the largest of which occur a mile southwest of Public Landing, in the vicinity of Mount Zion Church, one-half mile south of Tilghman Pond, and on a few small islands on the inner border of the coastal beach and along the bays. These differ from Norfolk sand only in texture.

Norfolk sand occurs as small ridges throughout the northwestern part of the county and on the east bank of Pocomoke River. The largest area is in the vicinity of Furnace.

Areas of Norfolk sand range from undulating to gently rolling. Most of this soil occurs as low ridges and knolls. The drainage varies from good to excessive.

This is not an important soil agriculturally. Only a small percentage is cultivated and the remainder supports a forest growth of small oak, old-field pine, and a few maple. Corn is the chief crop. Sweet potatoes and garden vegetables do fairly well. Potatoes, strawberries, tomatoes, melons, cowpeas, and rye are also grown. Peaches do well. This is an early soil, but the crop yields are light. Current land values range from $5 to $40 an acre.

This soil does not require deep plowing and is easily managed. With heavy applications of fertilizer for truck crops fairly good yields are obtained.

Norfolk sand could be best improved by growing rye, cowpeas, and green-manure crops, and by continually adding organic matter. Probably if the fertilizer were added at different times during the growing season it would be much more beneficial as, owing to the porosity of the soil, the fertilizer leaches away rapidly.

Norfolk sand, aside from its use as an early trucking soil, should be used for forestry.

KEYPORT SILT LOAM

The topsoil of Keyport silt loam is grayish-brown silt loam about 8 inches deep. The yellow upper part of the subsoil is heavy silt loam or silty clay loam in texture and continues to a depth of about 16 inches. The lower part of the subsoil is slightly plastic yellow material mottled with gray and rust brown, and is silty clay loam or silty clay in texture. This layer continues to a depth ranging from 30 to 36 inches. In most places below this depth a substratum of mottled grayish-yellow loamy fine sand occurs. Many slight variations are present. Where this soil joins areas of Elkton silt loam, the subsurface material is light gray and the subsoil is not typically yellow. Where it joins the Sassafras soils, the surface soil is grayish-brown and is underlain by brownish or reddish material mottled with gray and yellow.

Keyport silt loam occurs in narrow strips bordering Elkton silt loam, lying between it and the finer textured Sassafras soils throughout the central and southern parts of the county. The largest areas are in the vicinity of Corbin and Newark, and small patches occur throughout the larger areas of Elkton silt loam.

Areas of this soil are level, or in some places are slightly sloping toward areas of Elkton silt loam or toward small drainage ways. Where Keyport silt loam occurs in small patches in the large areas of Elkton silt loam, it is slightly elevated above the Elkton soil. Natural drainage is not well established, and where the soil is under cultivation it is necessary to ditch it to obtain proper drainage. This soil is better drained than the Elkton soils, but not so well drained as the finer textured Sassafras soils. On account of its close, fine texture it is the most poorly drained soil of the Keyport series, and during rainy seasons crops are sometimes drowned out.

Keyport silt loam is not an extensive soil in this county, but the well-drained areas are important agriculturally. Probably 65 per cent of it is under cultivation, and the remainder supports a forest growth of pine, maple, dogwood, cedar, oak, sweet gum, and holly, and an undergrowth of myrtle and other shrubs.

The crops are similar to those grown on Sassafras loam, and the soil is best suited to general farm crops and peaches. (Pl. 1, C.) In favorable seasons the yields compare favorably with those obtained on Sassafras loam. This soil is managed and fertilized in about the same manner as adjoining Sassafras soils.

Keyport silt loam is commonly sold in conjunction with adjoining soils. If included with Sassafras loam the price usually ranges from $50 to $200 an acre, depending upon the location with respect to

shipping points, and the improvements. Keyport silt loam responds to the same methods of fertilization as are suggested for the Sassafras soils. Much of it could easily be drained and improved for agricultural purposes. Organic matter in the form of coarse manures or green crops would improve the physical condition of the soil, which has a tendency to puddle when wet and to clod when dry.

KEYPORT SANDY LOAM

The surface soil of Keyport sandy loam, to an average depth of about 8 inches, is gray or grayish-brown sandy loam or heavy sandy loam. This layer is underlain, to a depth ranging from 12 to 16 inches, by a subsurface layer of olive-drab heavy sandy loam or sandy clay loam, faintly mottled with gray. The subsoil, to a depth of about 30 inches, is mottled yellow, reddish-brown, and gray sandy clay. The lower part of the subsoil, or the fourth layer, is gray slightly sticky sandy loam mottled with yellow and brown. In many places, at a depth varying from 30 to 36 inches, the material grades to yellow loamy sand. Keyport sandy loam is a transitional soil between Elkton sandy loam and Sassafras sandy loam and has certain characteristics of both of these soils. As mapped in this county, it includes areas of both Sassafras sandy loam and Elkton sandy loam.

Keyport sandy loam is not extensive, but a few small areas are scattered throughout the county, the largest occurring 3 miles south of Whiteburg, 2 miles east of Betheden Church, and southeast of Bishop.

As a rule areas of this soil are level, but where they border a drainage way they may be sloping. The elevation ranges from nearly sea level to about 40 feet above. The greater part of this soil is so situated that artificial drainage can be provided at little expense.

On account of its small extent, Keyport sandy loam is not an important agricultural soil. However, good crop yields, in many places equal to those on Sassafras sandy loam, are obtained on the better-drained areas. Probably 60 per cent of the soil is under cultivation, and the remainder is forested with pine, gum, oak, hickory, maple, and an undergrowth of myrtle, huckleberry, and other shrubs. The crops grown on Keyport sandy loam are the same as those produced on Sassafras sandy loam and, except in years in which the spring season has been wet the yields are equal to or only slightly less than those obtained on the Sassafras soil.

The cultivation and fertilization practices for this soil are the same as for Sassafras sandy loam.

Keyport sandy loam, when sold in conjunction with Sassafras sandy loam, brings as good a price as the latter soil; when sold with Elkton sandy loam the price is not so high; and when sold separately the price is from $50 to $150 an acre, depending upon improvements and nearness to towns and lines of transportation.

The general suggestions given for the improvement of Sassafras sandy loam apply to this soil after drainage is provided.

KEYPORT FINE SANDY LOAM

The topsoil of Keyport fine sandy loam consists of a surface layer, from 7 to 9 inches thick, of grayish-brown or light-brown heavy fine sandy loam and a subsurface layer, 8 or 9 inches thick, of compact fine sandy loam or fine sandy clay loam, pale yellow or yellow faintly mottled with gray in color. The subsoil of yellowish, reddish-brown, and gray mottled fine sandy clay grades, at a depth ranging from 30 to 36 inches, to grayish-yellow loamy fine sand. Keyport fine sandy loam differs from Sassafras fine sandy loam in that it is not so well drained, has more gray in the surface soil, and has a more mottled subsoil. It differs from Elkton fine sandy loam in that the surface soil is not so light a gray, the soil is better drained, and the color shows that oxidation has been more complete. The surface soil is uniform, but considerable variations occur in the subsoil. In many places throughout the county, the subsoil is not so heavy as in the typical soil and in some places it is more like loamy fine sand than fine sandy loam.

Keyport fine sandy loam occurs in comparatively small areas throughout the county. It has developed on the uplands as well as on the bay fronts. The largest areas are northeast of Sinepuxent Neck.

Areas of Keyport fine sandy loam, as a rule, are flat, though in places they are low and ridgelike and are slightly elevated above the surrounding Elkton soils. The elevation ranges from sea level to 40 feet above. Drainage is imperfect and in order to farm this land successfully artificial drainage is necessary. Owing to its fine texture, this soil is not so well drained as Keyport sandy loam.

Keyport fine sandy loam has the largest acreage of any of the Keyport soils, but the total acreage is small as compared with other soils. It is considered a valuable soil and more than half of it is under cultivation. The remainder supports a forest growth consisting chiefly of oak, pine, dogwood, hickory, and a thick growth of shrubs. The same crops are grown as are common on the Sassafras soils, except that more strawberries are produced on Keyport fine sandy loam. Where the soil has been properly drained, the crop yields are approximately the same as on Sassafras fine sandy loam. The soil is managed in the same way and the same quantities and kinds of fertilizer are used as on Sassafras sandy loam and Keyport sandy loam.

The selling price of this land ranges from $50 to $150 an acre depending upon drainage, location, and improvements. Drainage is the first step in its improvement. When it is properly drained, this soil responds to the methods of improvement suggested for Sassafras sandy loam.

TIDAL MARSH

Tidal marsh may be bluish, drab, brown, or black in color, and loam, clay loam, clay, or silt loam in texture. It contains large quantities of vegetable matter in different stages of decomposition. This material may continue to a depth of 3 or 4 feet or it may grade, at a depth varying from 10 to 15 inches, to slightly heavier clay of a lighter color but containing less organic matter.

Tidal marsh includes the extensive salt marshes along the Atlantic and Gulf Coasts and occurs where the tide rises and falls. In this county tidal marsh occurs chiefly as a narrow fringe around Chincoteague, Sinepuxent, and Isle of Wight Bays, and along the lower part of Pocomoke River as far as the salt tides extend. Small strips are near the mouth of the small streams draining into the bays, and numerous small islands in the bays consist of this material.

Areas of tidal marsh are flat or gently inclined toward the sea. Most of the soil is submerged during each flow of the tide, and for this reason and because of the excess of salt, none of the tidal marsh is used for farming. It supports a heavy growth of marsh grasses which afford considerable pasturage for cattle.

If reclaimed by dikes and if the excess of salt were removed by rains, this land would be fit for farming purposes. Probably rice corn, and hay would succeed best. However, the reclamation of tidal marsh at this time would not be justified by the possible returns, but in the future if the population becomes very dense it may be an economical undertaking.

Tidal marsh, high phase.—Tidal marsh, high phase, represents an intermediate stage between the Elkton soils and the low marshes and has certain characteristics of both of these soils.

The high tidal marsh resembles the Elkton soils, except that the surface material in places contains considerable decaying vegetable matter. It occurs at slightly higher elevations within the salt marshes and in localities where the mainland slopes suddenly to nearly tidal-marsh level.

Tidal marsh, high phase, is mapped in only a few places near the mainland on the seaward side of Worcester County. It supports a growth of scattered stunted pines, and the grasses and shrubs are similar to those on typical tidal marsh. It is used only as pasture. Tidal marsh, high phase, is slightly above ordinary high tide level but it is flooded at times of unusually high tide.

COASTAL BEACH

Coastal beach is composed of white, light-gray, or light-brown sand which continues to a depth of several feet without much change in color or texture. A number of sea shells are scattered throughout the sand.

This material occurs only on the long, narrow beach which separates Chincoteague, Sinepuxent, and Isle of Wight Bays from the ocean. This beach varies in width from a few hundred feet to about a mile, and in elevation from a few feet to about 20 feet above sea level. The surface features include ridges, knolls, dunes, and depressions. The position of this sand is being constantly changed by the action of tides and wind. At present coastal beach has no agricultural value.

On the inner border of this coastal beach or on the side next to the bays, there are in many places surface accumulations of organic matter which impart a gray or dark-gray color to the material. Such areas support a growth of small narrow-leaved oak, myrtle bushes, and a variety of grasses commonly found along the beach, which furnish some forage for ponies, sheep, goats, hogs, and cattle.

Included with coastal beach as mapped are strips of meadow which are too small to map separately.

SWAMP

Low areas which are covered with water the greater part of the year and which in their present condition can not be cultivated have been classed as swamp. This material has no definite texture. In the upland areas the texture is influenced largely by surrounding soils. Where swamp occurs in association with Elkton silt loam and Elkton loam it consists of muck or mucky loam underlain, at a depth ranging from 5 to 15 inches, by the mottled clay subsoil characteristic of these soils. In other places, the subsoil is mottled sand, sandy loam, or sandy clay loam. The surface soil is everywhere more or less mucky, and much of this land, if drained, would be classed as muck or Portsmouth loam.

Swamp occurs in narrow strips along most of the small streams and in rather extensive areas along the larger streams of the county. On the eastern side of the county it grades to tidal marsh as base level is reached. The largest areas are along Pocomoke River and Nassawango and Dividing Creeks. None of the swamp is cultivated. The forest growth consists chiefly of cypress, gum, water maple, bay, a few scattered pines, and a dense undergrowth of briers and water-loving shrubs.

By deepening and straightening the channel and by lateral ditching and tile draining, some of this land could be reclaimed. Such measures would greatly benefit the drainage of the surrounding areas as well as those of the swamp.

SUMMARY

Worcester County is in the extreme eastern part of Maryland, known as the Eastern Shore. The county varies from flat to gently rolling and rolling. The slope of four-fifths of the county is toward the west and is gradual; of the other fifth it is to the southeast and is more abrupt.

The drainage is effected mainly through Pocomoke River and Nassawango and Dividing Creeks. The Atlantic side is drained by short streams flowing into the embayments of tidal water. Natural drainage has not been established throughout a large part of the county.

In 1742 Worcester County was formed from a part of Somerset County. The population is unevenly distributed, with an average density of 45.1 persons to the square mile. Railroad facilities are good, the main highways are excellent, and fairly good roads reach all parts of the county.

The rainfall is sufficient and is well distributed throughout the year. Mild winters are common. The average frost-free season of 201 days is sufficient for maturing all crops grown in this section.

The agriculture of Worcester County consists of truck and general farming. The main truck crops are potatoes, strawberries, and tomatoes. Corn, wheat, and hay are the most important of the staple crops. Crop rotations are practiced by the best farmers, and the

use of commercial fertilizer is general. Land values range from $10 to $200 an acre.

Forestry and fishing are important industries of the county and are closely linked with farming.

Worcester County lies wholly within the coastal plains region of Maryland, and the soil materials were recently deposited in coastal water. Eighteen soil types, representing five soil series, and in addition, land classed as tidal marsh, coastal beach, and swamp are mapped.

Sassafras sandy loam, Sassafras fine sandy loam, Sassafras loam, Portsmouth sandy loam, Portsmouth fine sandy loam, Norfolk sandy loam, Keyport sandy loam, Keyport fine sandy loam, and Keyport silt loam are the most important agricultural soils. Elkton sandy loam, Elkton fine sandy loam, Elkton loam, Elkton silt loam, and Portsmouth loam are the more poorly drained soils of the county, and it is necessary that they be drained artificially before they are suitable for productive farming. Sassafras sand and Norfolk sand are considered poor farming soils, and the swamps, coastal beach, and tidal marsh in their present condition are nonagricultural.

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[PUBLIC RESOLUTION—No. 9.]

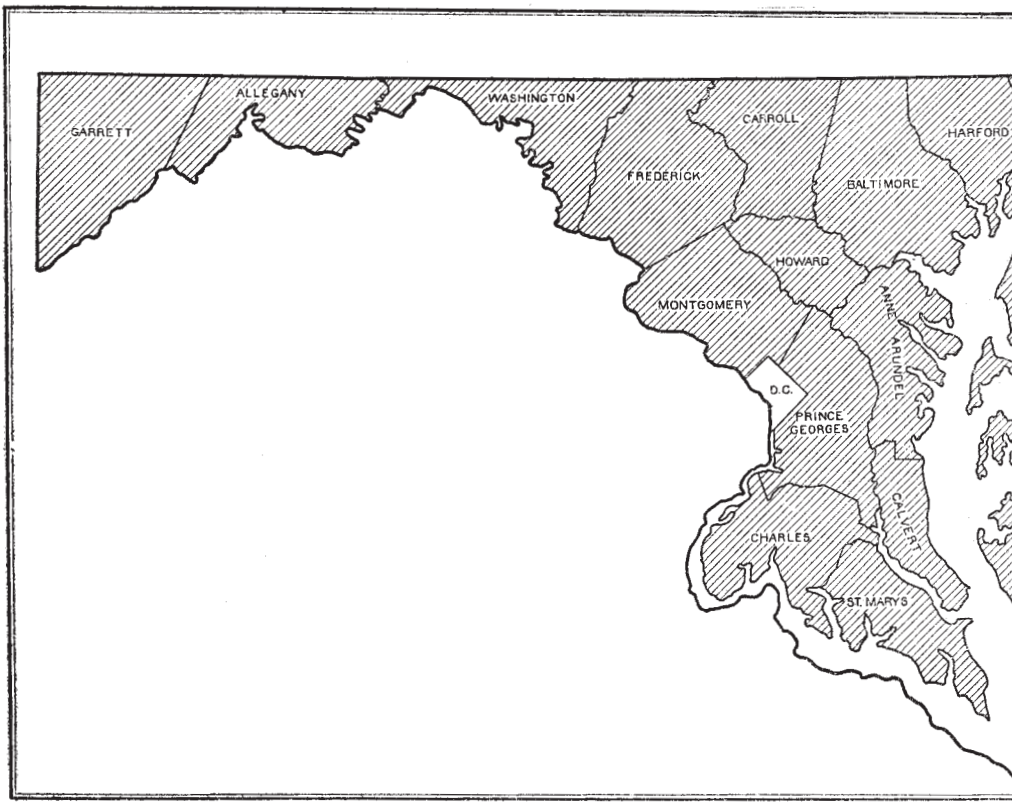
JOINT RESOLUTION Amending public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, "providing for the printing annually of the report on field operations of the Division of Soils, Department of Agriculture."

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, be amended by striking out all after the resolving clause and inserting in lieu thereof the following:

That there shall be printed ten thousand five hundred copies of the report on field operations of the Division of Soils, Department of Agriculture, of which one thousand five hundred copies shall be for the use of the Senate, three thousand copies for the use of the House of Representatives, and six thousand copies for the use of the Department of Agriculture: *Provided*, That in addition to the number of copies above provided for there shall be printed, as soon as the manuscript can be prepared, with the necessary maps and illustrations to accompany it, a report on each area surveyed, in the form of advance sheets, bound in paper covers, of which five hundred copies shall be for the use of each Senator from the State, two thousand copies for the use of each Representative for the congressional district or districts in which the survey is made, and one thousand copies for the use of the Department of Agriculture.

Approved March 14, 1904.

[On July 1, 1901, the Division of Soils was reorganized as the Bureau of Soils, and on July 1, 1927, the Bureau of Soils became a unit of the Bureau of Chemistry and Soils.]



Areas surveyed in Maryland, shown by shading

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Office of the Assistant Secretary for Civil Rights
1400 Independence Avenue, SW
Washington, D.C. 20250-9410;

(2) fax: (202) 690-7442; or

(3) email: program.intake@usda.gov.

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U. S. DEPARTMENT OF AGRICULTURE
BUREAU OF CHEMISTRY AND SOILS
HENRY G. KNIGHT, CHIEF
A. G. McCALL, CHIEF, SOIL INVESTIGATIONS
CURTIS F. MARBUT, IN CHARGE SOIL SURVEY

SOIL MAP
WORCESTER COUNTY
MARYLAND

MARYLAND GEOLOGICAL SURVEY
EDWARD BENNETT MATHEWS, STATE GEOLOGIST
MARYLAND AGRICULTURAL EXPERIMENT STATION
H. J. PATTERSON, DIRECTOR

LEGEND

- Elkton sandy loam — E
- Portsmouth sandy loam — Ps
- Elkton fine sandy loam — Ef
- Portsmouth fine sandy loam — Pf
- Elkton loam — El
- Portsmouth loam — Pl
- Elkton silt loam — Em
- Sassafras sand — Sf
- Keyport sandy loam — Ky
- Sassafras loamy sand — Sy
- Keyport fine sandy loam — Kf
- Sassafras sandy loam — Ss
- Keyport silt loam — Ks
- Sassafras fine sandy loam — Sm
- Norfolk sand — N
- Sassafras loam — Sl
- Norfolk loamy sand — Nl
- Coastal beach — C
- Norfolk sandy loam — Ns
- Tidal marsh — T
- Swamp — S
- High phase — ′

CONVENTIONAL SIGNS

CULTURE *(Printed in black)*

- City or Village, Roads, Buildings, Wharves, Jetties, Breakwater, Levee, Lighthouse, Fort
- Secondary roads and Trails
- Railroads, Steam and Electric
- Bridges, Ferry
- R.R. crossings, Tunnel
- Ford, Dam
- School or Church, Cemeteries
- Mine or Quarry, Mine dumps, Made land
- Bluff, Escarpment, Rock outcrop and Triangulation station
- Stony and Gravelly areas
- Soil boundaries
- Boundary lines (State, County)
- Boundary lines (Land grant, City or Village)
- Boundary lines (Civil township, Reservation)
- U.S. township and section lines

RELIEF *(Printed in brown or black)*

- Contours, Depression contours
- Prominent Hills, Mountain Peaks
- Sand, Wash, and Sand dunes
- Shore and Low-water line, Sandbar

DRAINAGE *(Printed in blue)*

- Streams
- Lakes, Ponds, Intermittent lakes
- Intermittent streams
- Swamps, Canals and Ditches, Flumes
- Swamp, Salt marshes
- Submerged marsh, Tidal flats

The above signs are in current use on the soil maps issued since this range appear in some maps of earlier dates.

W. Edward Hearn, Inspector, District 2.
Soils surveyed by S. O. Perkins, U. S. Department of Agriculture, in charge, and S. R. Bacon, Maryland Agricultural Experiment Station.

BASE MAP FROM
U. S. GEOLOGICAL SURVEY SHEETS

Scale 1:62500
1 0 1 2 3 4 Miles
1 0 1 2 3 4 5 Kilometers
Contour interval 10 feet.
Datum is mean sea level.

A. Hoen & Co. Lith. Baltimore, Md.

Field Operations
Bureau of Soils
1924